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Claims

[c1] 1. A method for increasing the amount of EGR flow and enhancing exhaust gas recirculation efficiency on a combustion engine, comprising:
providing a combustion engine having an exhaust system in fluid communication, via at least one juncture, with an exhaust gas recirculation system;
locating a reflector in the exhaust system downstream of the at least one juncture, the reflector adapted to reflect at least a portion of exhaust gas pressure pulses emitting from the combustion engine thereby causing a reflected pressure pulse to occur upstream of the reflector; and
deflecting at least a portion of the reflected pressure pulse into the exhaust gas recirculation system thereby enhancing the efficiency of the exhaust gas recirculation system.

[c2] 2. The method of claim 1, further comprising:
locating a one-way valve in the exhaust gas recirculation system, the one-way valve being configured to permit an upper-pressure portion of pressure pulses directed into the exhaust gas recirculation system to be conveyed to

an inlet air manifold of the combustion engine.

[c3] 3. The method of claim 2, further comprising:
configuring the one-way valve to be biased toward a closed configuration by a spring force, the spring force being selected to be overcome and the one-way valve moved to an open configuration when an upstream gas pressure thereto exceeds a predetermined threshold pressure thereby capturing the upper-pressure portion of the pressure pulses for conveyance to the inlet air manifold.

[c4] 4. The method of claim 2, further comprising:
locating a turbine in the exhaust system; and
locating the reflector upstream of the turbine in the exhaust system.

[c5] 5. The method of claim 2, further comprising:
configuring the exhaust system to define an exhaust gas flow path and configuring the reflector as a projection into the exhaust gas flow path.

[c6] 6. The method of claim 5, further comprising:
constructing the reflector in a sheet form thereby establishing an abrupt restriction in the exhaust gas flow at an upstream side of the reflector and an abrupt expansion in the exhaust gas flow at a downstream side of the re-

flector.

[c7] 7. The method of claim 5, further comprising:
arranging a reflective face of the reflector at a substantially right angle to the exhaust gas flow path.

[c8] 8. The method of claim 7, further comprising:
configuring the reflective face symmetrically with respect to the exhaust gas flow.

[c9] 9. The method of claim 2, further comprising:
providing a turbine in fluid communication with the exhaust system for recovering energy from the exhaust gas pressure pulses emitted from the combustion engine; and
selecting the turbine so that a collective efficiency of energy recovery and exhaust gas recirculation is optimized.

[c10] 10. The method of claim 2, further comprising:
configuring the reflector as a gasket secured between a first and a second flange.

[c11] 11. An enhanced exhaust gas recirculation system for a combustion engine comprising:
a combustion engine having an exhaust system in fluid communication, via at least one juncture, with an exhaust gas recirculation system; and
a reflector means located in the exhaust system down-

stream of the at least one juncture, the reflector means configured for reflecting at least a portion of exhaust gas pressure pulses emitting from the combustion engine thereby causing a reflected pressure pulse to occur upstream of the reflector and the exhaust and exhaust gas recirculation systems being together configured to deflect at least a portion of the reflected pressure pulse into the exhaust gas recirculation system thereby enhancing the efficiency of the exhaust gas recirculation system.

[c12] 12. The enhanced exhaust gas recirculation system of claim 11, further comprising:
a one-way valve located in the exhaust gas recirculation system, the one-way valve being configured to permit an upper-pressure portion of pressure pulses directed into the exhaust gas recirculation system to be conveyed to an inlet air manifold of the combustion engine.

[c13] 13. The enhanced exhaust gas recirculation system of claim 12, further comprising:
the one-way valve being biased toward a closed configuration by a spring force, the spring force being selected to be overcome and the one-way valve moved to an open configuration when an upstream gas pressure thereto exceeds a predetermined threshold pressure thereby capturing the upper-pressure portion of the pressure

pulses for conveyance to the inlet air manifold.

[c14] 14. The enhanced exhaust gas recirculation system of claim 12, further comprising:
a turbine located in the exhaust system; and
the reflector being located upstream of the turbine in the exhaust system.

[c15] 15. The method of claim 12, further comprising:
the exhaust system defining an exhaust gas flow path and the reflector configured as a projection into the exhaust gas flow path.

[c16] 16. The enhanced exhaust gas recirculation system of claim 15, further comprising:
the reflector being constructed in sheet form thereby establishing an abrupt restriction in the exhaust gas flow at an upstream side thereof and an abrupt expansion in the exhaust gas flow at a downstream side thereof.

[c17] 17. The method of claim 15, further comprising:
a reflective face of the reflector arranged at a substantially right angle to the exhaust gas flow path.

[c18] 18. The enhanced exhaust gas recirculation system of claim 17, further comprising:
the reflective face being symmetrically configured with respect to the exhaust gas flow.

[c19] 19. The enhanced exhaust gas recirculation system of claim 12, further comprising:
a turbine in fluid communication with the exhaust system for recovering energy from the exhaust gas pressure pulses emitted from the combustion engine and the turbine being selected so that a collective efficiency of energy recovery and exhaust gas recirculation is optimized.

[c20] 20. The enhanced exhaust gas recirculation system of claim 12, further comprising:
the reflector being configured as a gasket secured between a first and second flange.

[c21] 21. The enhanced exhaust gas recirculation system of claim 12, further comprising:
the reflector being configured as a cast and/or machined restriction in the exhaust manifold.

[c22] 22. A method for increasing the amount of EGR flow and enhancing exhaust gas recirculation efficiency on a combustion engine, comprising:
providing a combustion engine having an exhaust system including a manifold configured to receive exhaust gases from a plurality of engine cylinders and to convey at least a portion of the exhaust gases downstream to an exhaust outlet;

providing at least one juncture off of the manifold that conveys at least a portion of the exhaust gases to an exhaust gas recirculation system;

locating a reflector at the manifold in associated with the exhaust outlet, the reflector adapted to reflect at least a portion of exhaust gas pressure pulses emitting from the combustion engine thereby causing a reflected pressure pulse to occur in the manifold; and

deflecting at least a portion of the reflected pressure pulse into the exhaust gas recirculation system thereby enhancing the efficiency of the exhaust gas recirculation system.

[c23] 23. The method of claim 22, further comprising:
configuring the reflector as a gasket secured between a first and a second flange.

[c24] 24. The method of claim 22, further comprising:
configuring the reflector as a cast restriction at the exhaust outlet of the manifold.

[c25] 25. The method of claim 22, further comprising:
configuring the reflector as a machined restriction at the exhaust outlet of the manifold.

[c26] 26. The method of claim 22, further comprising:

locating a one-way valve in the exhaust gas recirculation system, the one-way valve being configured to permit an upper-pressure portion of pressure pulses directed into the exhaust gas recirculation system to be conveyed to an inlet air manifold of the combustion engine.